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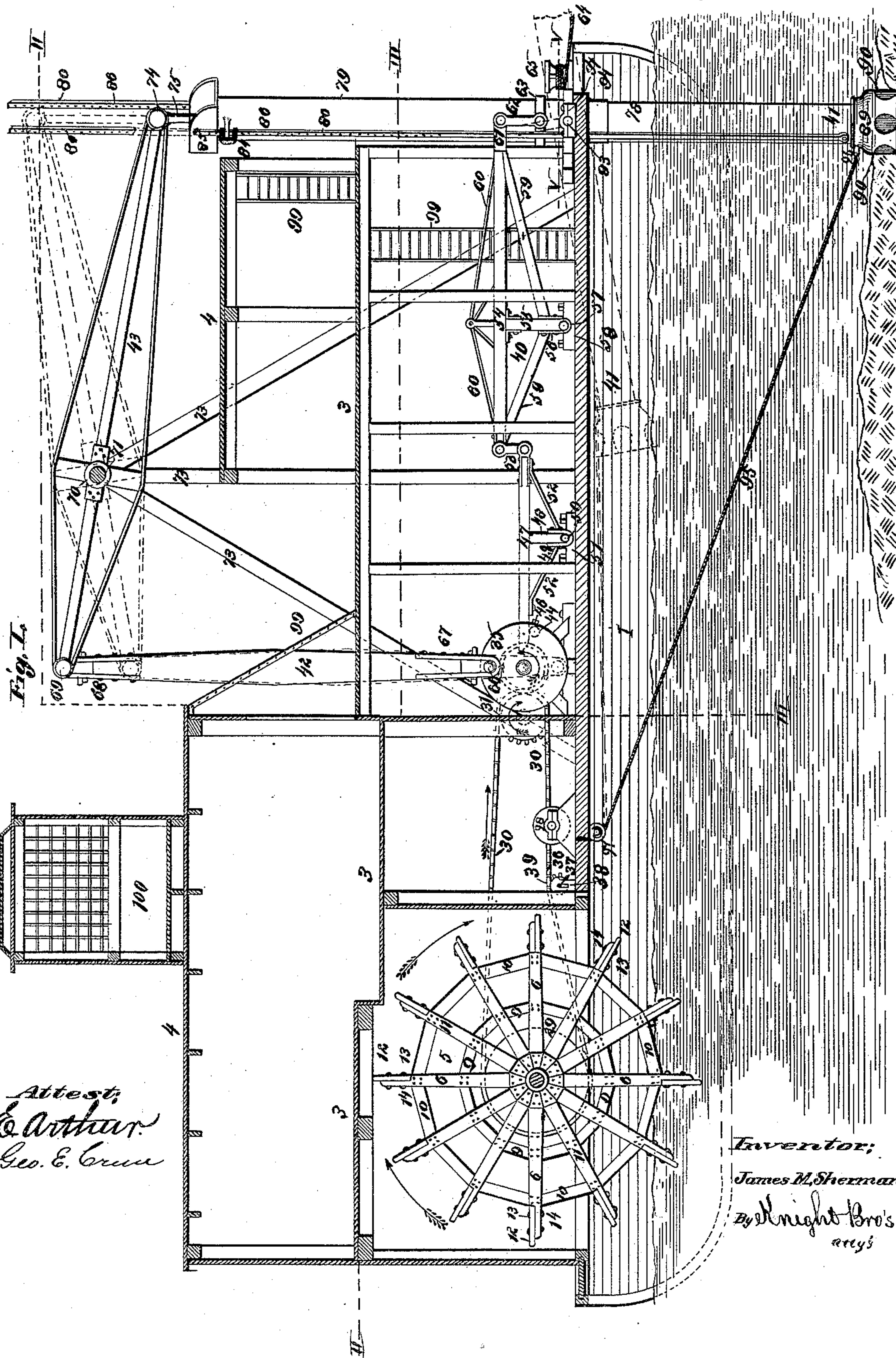
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J. M. SHERMAN.

RIVER DREDGE OR EXCAVATOR.

No. 431,405.

Patented July 1, 1890.



Attest,
Geo. E. Crum

Inventor;
James M. Sherman
By Knight Bros.
attys

(No Model.)

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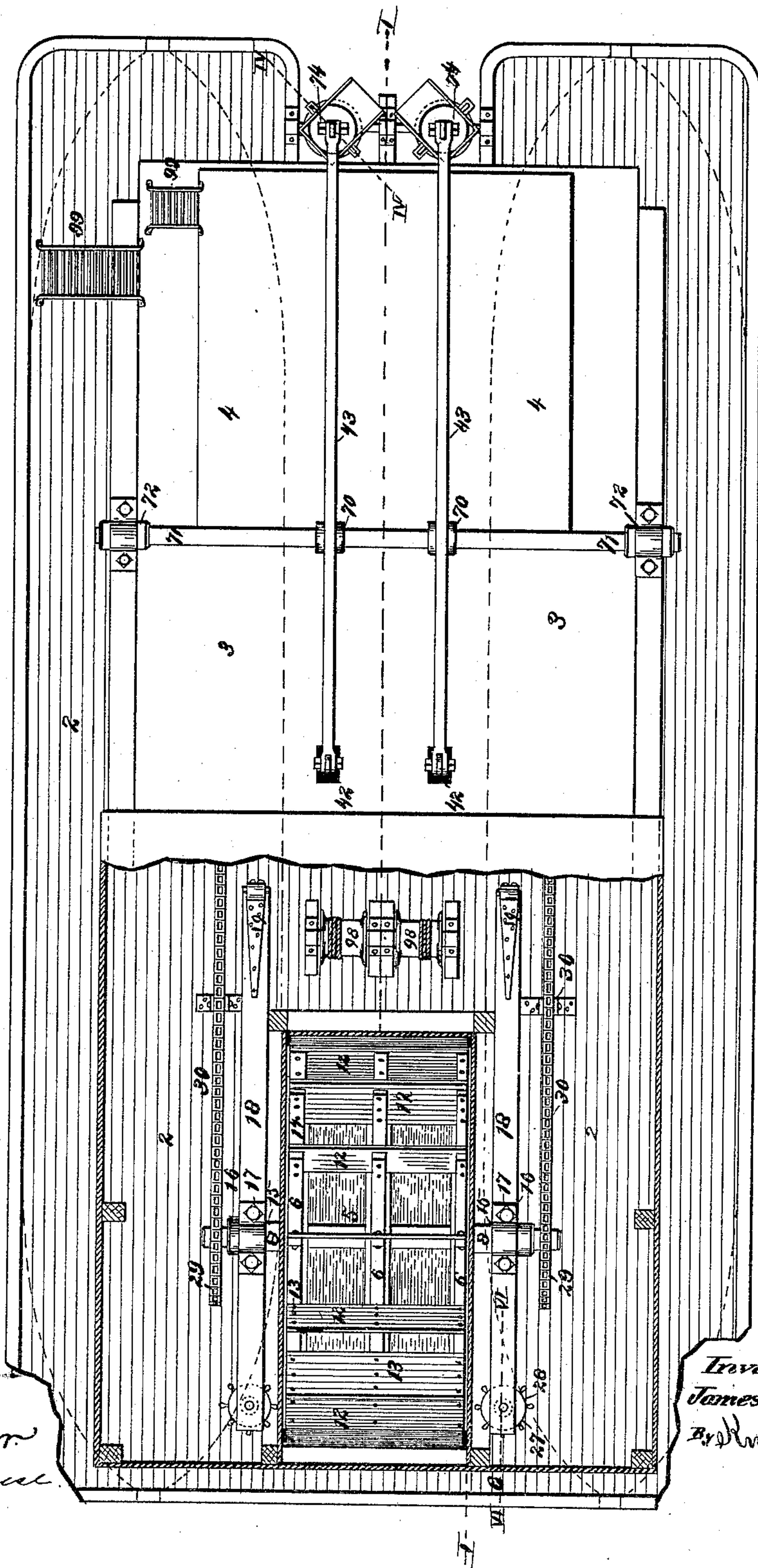
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Fig. II,



Attest,
E. Arthur
Geo. E. Burr.

Inventor;
James M. Sherman.
Bro. Knight Bros.
engs

(No Model.)

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Fig. III.

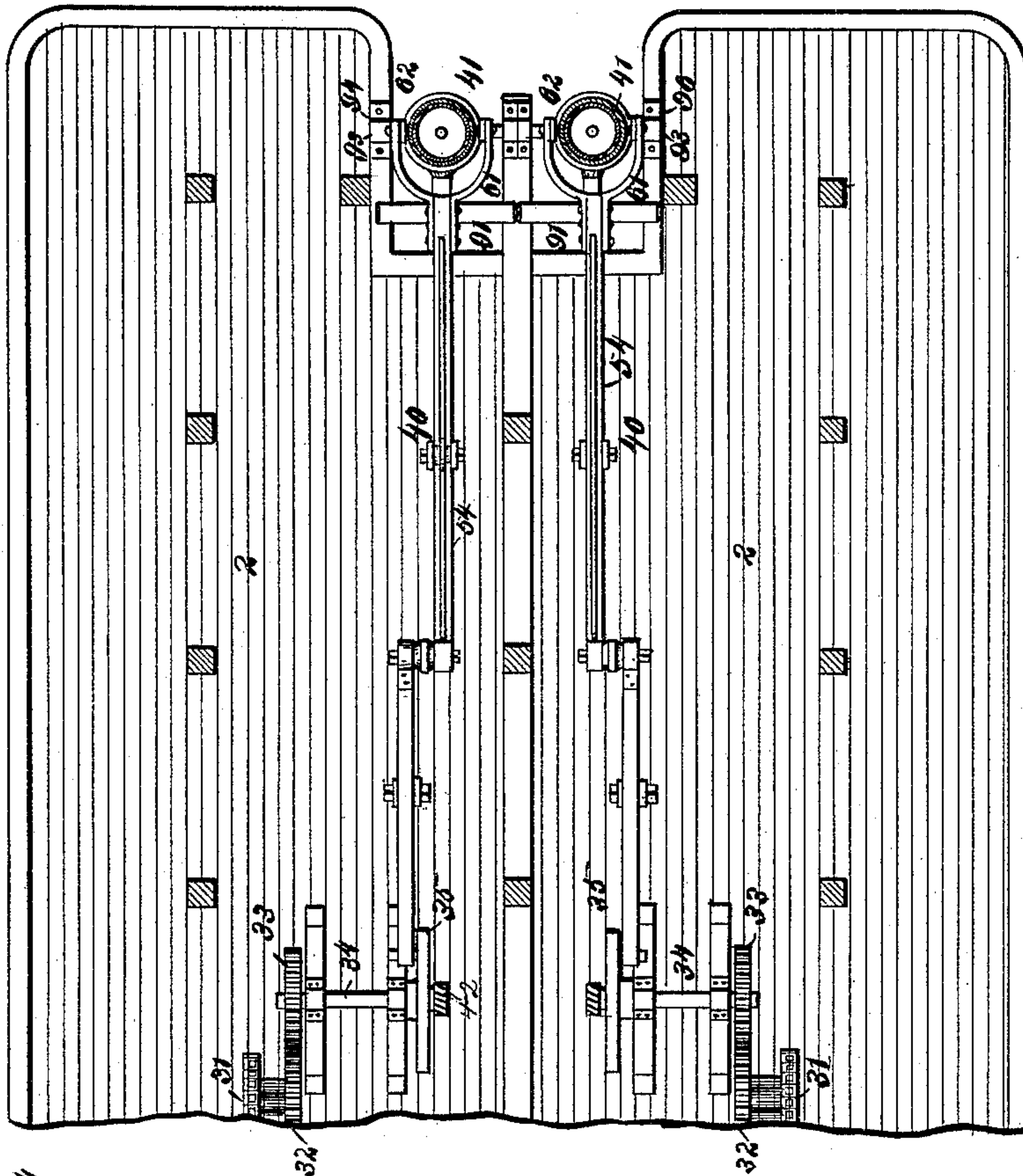


Fig. IV.

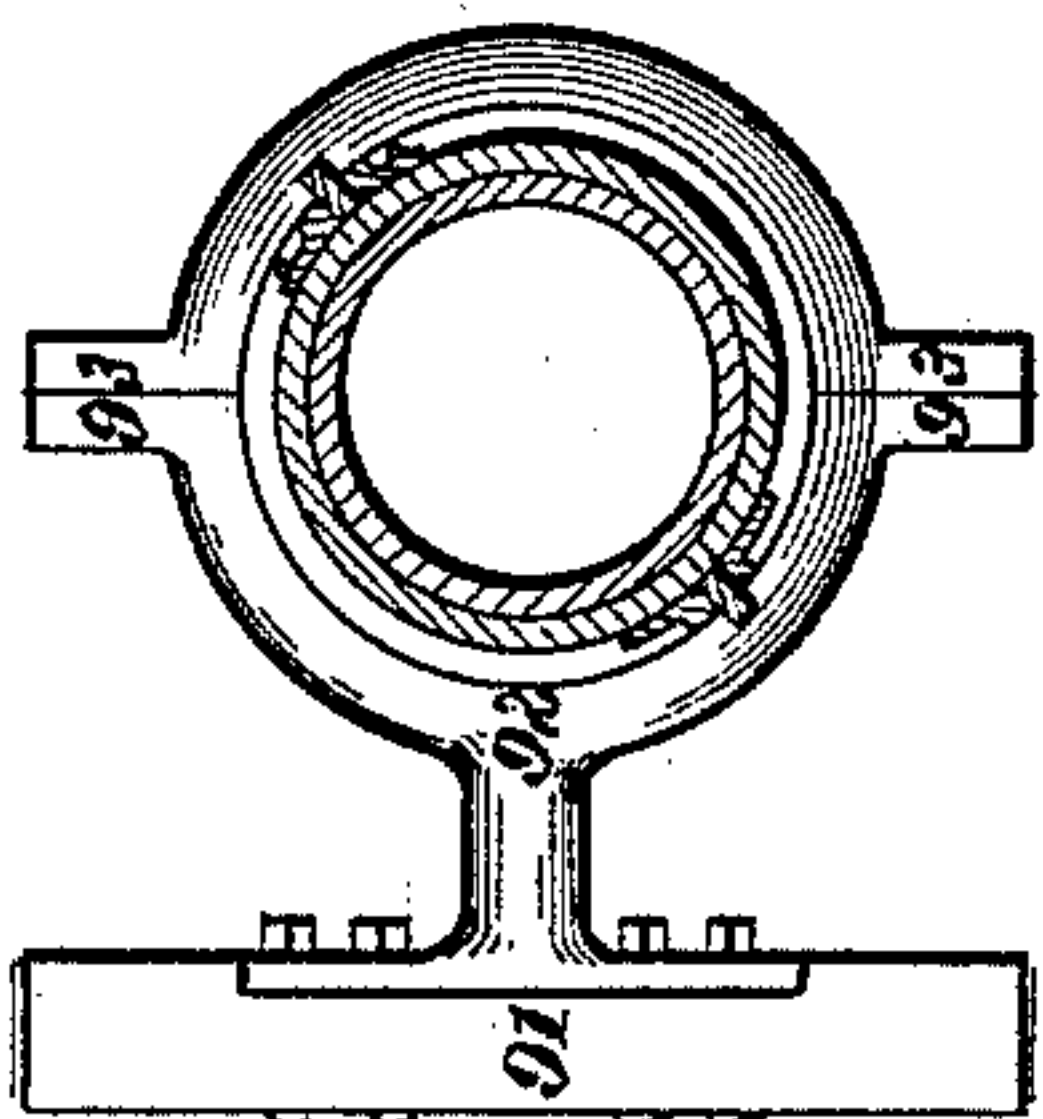
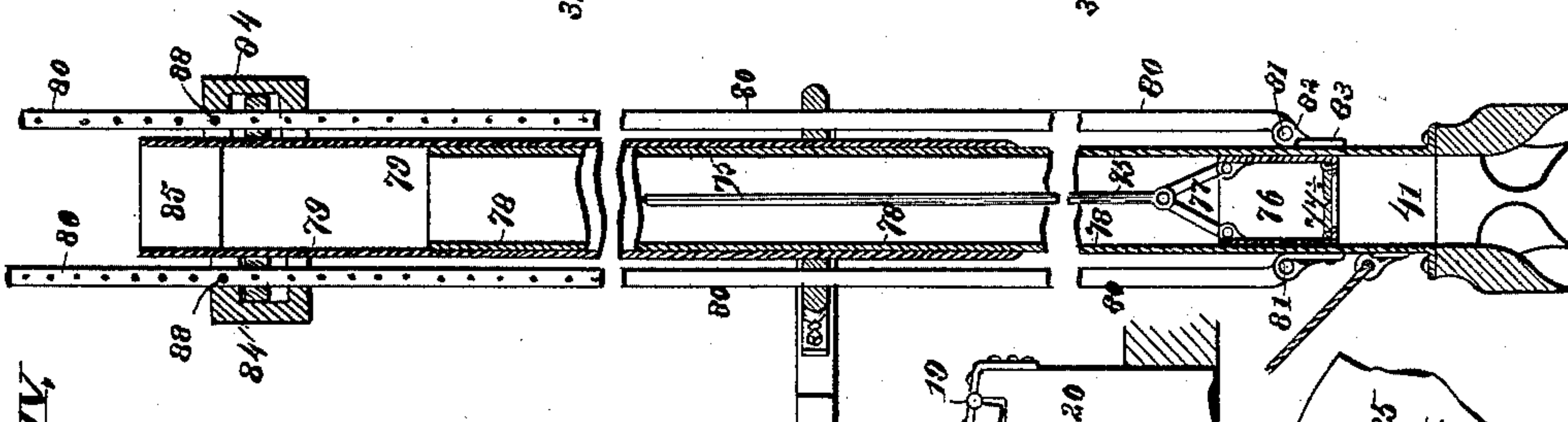
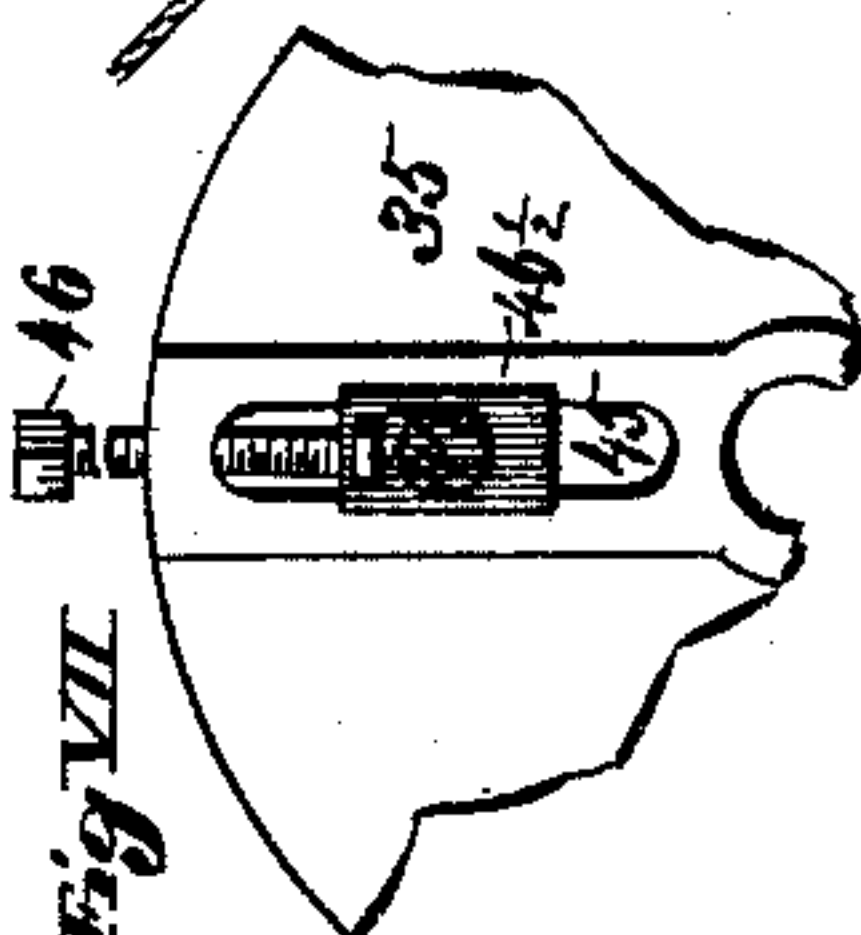
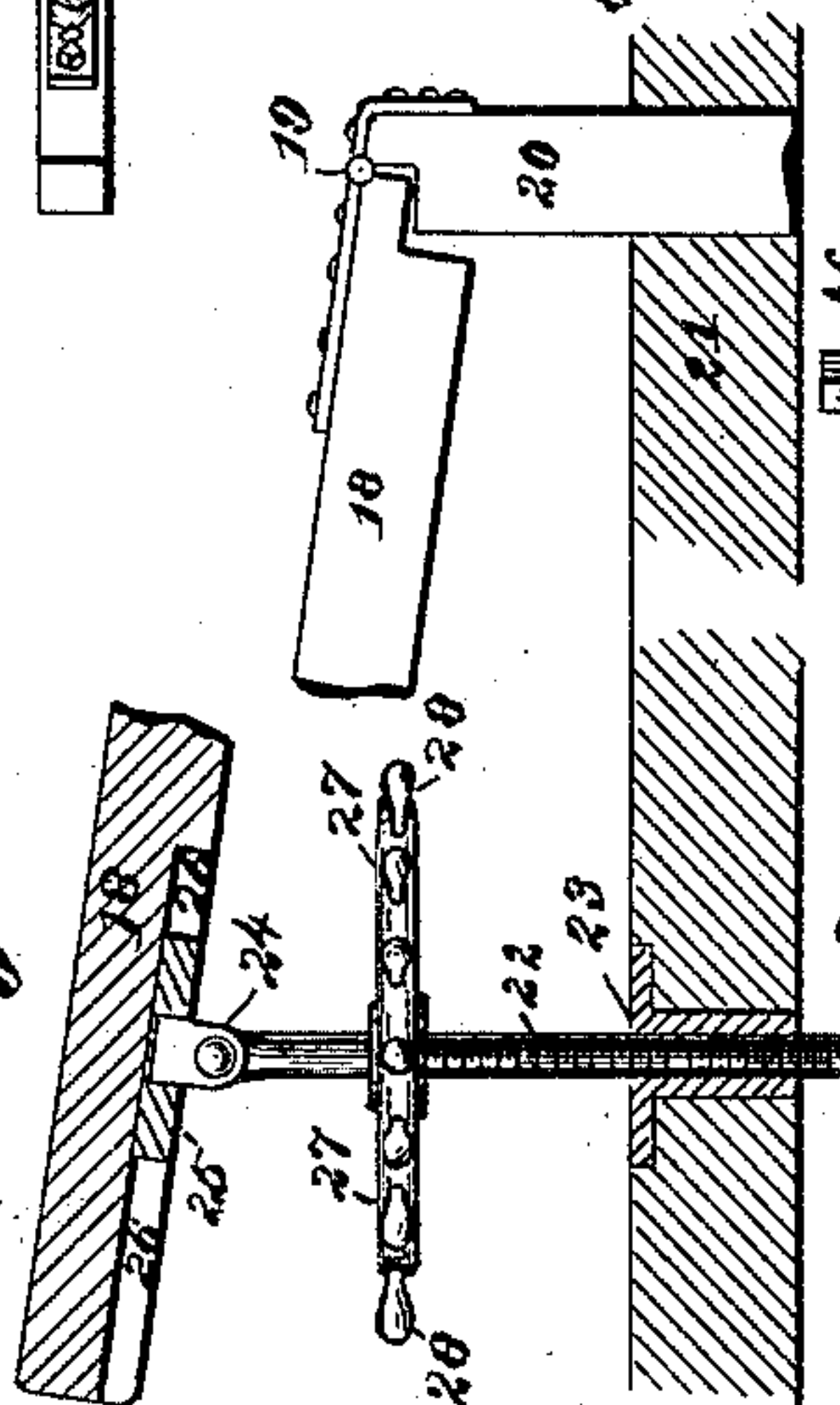


Fig. VI.



Inventor:
James M. Sherman.

By Knight Bros.
attys

Attest:
E. Arthur.
Geo. E. Burr

Fig. V.

UNITED STATES PATENT OFFICE.

JAMES M. SHERMAN, OF ST. LOUIS, MISSOURI.

RIVER DREDGE OR EXCAVATOR.

SPECIFICATION forming part of Letters Patent No. 431,405, dated July 1, 1890.

Application filed December 9, 1889. Serial No. 333,124. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. SHERMAN, of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in River Dredges or Excavators, of which the following is a full, clear, and exact description, reference being had to the drawings, in which—

Figure I is a section on line I I, Fig. II, showing the current-wheel with one of the twin boats on which it has its bearings, and also the plunger and the machinery through which the current-wheel works said plunger. Fig. II is a section on line II II, Fig. I, showing the current-wheel, drums, and rocker-arms. Fig. III is a section on line III III, Fig. I, showing the crank-disks and the trip-action walking-beams that lift and drop the plungers. Fig. IV is a section on line IV IV, Fig. II, showing the telescopic tube that carries the plunger. Fig. V is a section on line V V, Fig. I, showing the guide for the tube. Fig. VI is a section on line VI VI, Fig. II, showing the method of adjusting the elevation of the current-wheel; and Fig. VII is a detail showing the means of adjustment and operation of the trip-pin.

My invention relates to a device for utilizing current-power for dredging in the beds of water-courses; and the invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Referring to the drawings, in which similar figures of reference indicate like parts in all the views, 1 1 represent the twin boats, that are covered and united by a joint deck 2. This deck is surmounted by the intermediate deck 3 and hurricane-decks 4.

5 represents the current-wheel, whose arms 6 are rigidly secured in the nave 7, that is also rigidly attached to the shaft 8, on which the wheel rotates. The braces 9 and 10 unite the arms at a given radial distance from each other, and their tenons are fastened in said arms by bolts or pins 11. Paddles 12 are secured to the outer ends of the arms by bolts 13, with their screw-nuts 14. The paddle-shaft has its bearings in metal journal-boxes 15, which, with their caps 16, are secured by bolts 17 to vertically-adjustable beams 18. The said beams are attached at one end by hinges

19 to vertical posts 20, that rise from the beams 21 of the hull, and near their other ends are supported on vertical rods 22, whose screw-threads engage in the screw-boxings 23 in the aforesaid beams 21. The vertical rods are surmounted by pivoted caps 24, which themselves have free rotary movement within their recessed seats in the head-blocks 25. The said head-blocks are seated in slotted boxings 26 in the under sides of the bearing-beams 18, the said boxing being of sufficient length to allow the head-block longitudinal adjustment as the bearing-beam above it is elevated or depressed.

The capstan-wheels 27, with radial handles 28 around them, are rigidly secured to the vertical rods and turn the same to adjust the elevation of the bearing-beams on which the shaft of the current-wheel is journaled. It will be seen that by the adjustment, as described, of the beam carrying the journal-bearings of the current-wheel it can be raised or lowered to increase or reduce the dip of the paddles in the current, varying it to various contingencies, such as the force of the current, the power required, &c.

The pulleys or band-wheels 29 are rigidly secured on the shaft of the current-wheel and carry endless drive-chains 30, which engage with and drive corresponding pulleys 31, whose shafts also carry pinion or spur wheels 32, the cogs of which engage with the gear-wheels 33, which are rigidly secured on the shafts 34, to which also are rigidly attached the operative crank-disks 35.

Sprocket-wheels 36, whose pins engage with the drive-chains, and which have adjustable pivot-bearings 37 within elongated slots 38 in short vertical studs 39, have threefold functions to perform, all of which are adjustable in their application. They adjust the tightening of the drive-chains to take up the slack, clear the passage of said chains above the main-deck, and increase the surface-friction on the band-wheels 29. The bearings of said sprocket-wheels are adjusted by underkeying in the elongated slot in any usual manner.

The disks 35 communicate power to the trip-action walking-beams 40 for elevating the two plungers 41 and tripping them for their descent, and through the vertical shafts 42

and walking-beams 43 reciprocating movement is given to the pumping device. It will thus be seen that the eccentric-disks as they rotate have twofold functions to perform—
 5 working both the trip-action walking-beams, that alternately elevate the plungers from the bed of the river and drop them again to renew their work, and at the same time they actuate the walking-beams 43, that work the
 10 pump-piston within the telescopic tubes of the plungers.

I will now proceed to describe the operation of the said rotary crank-disks 35 (in one of their functions) on the trip-action walking-beams 40, that elevate and trip the plungers, in the first place indicating the parts that compose said device and its operative connections with the rotary crank-disk, from which the power is transmitted, and with the
 20 plunger on which it operates.

44 represents the trip-pins, which are adjustable within elongated slots 45 in the rotary crank-disks, and 46 are the set-screws, which have swivel collar-connections with the
 25 sliding blocks 46½, in which the wrist-pins are seated, and firmly hold said wrist-pins to their adjustment. (See Fig. VII.)

47 are compound trip-levers with pendent studs 48 and metal bearing-clips 49. The
 30 levers have pivot-bearings 50 on the foot-blocks 51, and braces 52 stiffen said levers. Pivot-links 53 connect the trip-lever 47 to the walking-beam 40, of nearly similar but enlarged construction, with pendent studs 55
 35 and clips 56, the levers having pivot-bearings 57 on the foot-block 58, and being strengthened by wooden braces 59 beneath and iron braces 60. Clevis-bails 61, securely bolted to the outer ends of the levers 54, are connected
 40 by pendent pivoted links 62 to heavy metal grip-collars 63, that clasp the plungers. It will be seen that as the rotary crank-disks rotate the trip-pins 44, which in Fig. I have just come in contact with the trip-levers 47,
 45 elevate the initial ends of said levers and consequently depress the contrary ends, which, being connected by the pivot-links to the walking-beams 54, depress them at said ends, and consequently elevate the ends that,
 50 through their pivoted bails and grip-collars, clasp the plungers, thereby elevating the plungers from the bed of the river. The elevating process goes on as the crank-disks rotate, and the ends of trip-levers against which
 55 the trip-pins press are elevated until the trip-pins pass the ends of the levers, and then the walking-beams relax their hold on the plungers, which immediately fall by their own gravity into the bed of the river.

60 It will be understood that to regulate the height to which the walking-beams elevate the plungers the trip-pins are adjusted in the elongated slots in the rotary crank-disks and rigidly held by the sliding blocks 46½
 65 and set-screws that work in and adjustably hold said blocks. The nearer the wrist-pins are adjusted to the periphery of the disks

the longer will they retain their hold of the trip-levers 47, and consequently the higher will the plunger be elevated by the walking-
 70 beam that lifts it preparatory to its trip.

There is a similar difference in the nature of the soil at the bed of our rivers that there is on the surface of the ground, and consequently in dredging some river-beds it is
 75 required to raise the plunger higher than it is with others, so that by a more extended fall it may penetrate such beds as are of a comparatively dense nature. The dredge is
 80 moored or anchored by the cable 64, which winds around and is held by the capstan 65, the vessel dropping downstream until the cable is taut. It will thus be seen that by turning the capstan by the usual spike or any
 85 other suitable means the dredge can thus be moved up or down stream, so that the plunger will alight in the position where it is required in the bed of the river.

I will now describe the other function of the eccentric rotary disk—namely, that of operating the pump that raises the mud from
 90 the bank in the bed of the river—at first indicating the parts connected therewith.

The vertical shafts or arms 42 are secured to the eccentric rotary disks by the pivot-pins
 95 66, which work in the clip-irons 67, that are bolted to the feet of the shafts. Similar clips 68 at its head carry the bearings for the pins 69, that connect said shafts to the walking-beams 43, that work the pistons. The walking-
 100 beams are rigidly secured at their collars 70 to a shaft 71, that works in journal-boxes 72 on tripod-frames 73, that are planted on the main deck and rise through the intervening
 105 decks sufficiently above the hurricane-deck to allow play for the walking-beams to work the sand or mud pumps. The outer ends of the walking-beams are secured by
 110 pivot-pins 74 to the piston-rods 75, to which the buckets 76 are suspended by the bail-links 77, and said buckets have double-hinged trap-valves 77½. The pistons work within
 115 the telescopic tubes of the plungers, which are formed of inner tubes 78 and outer ones 79, that telescope each other.

80 represents adjustable rods that are pivoted at 81 to the lugs 82 on the grip-collars
 83, that grasp the lower tubes. These rods ascend longitudinally on each side of the telescopic tubes of the plunger and pass through
 120 the collars 84, that are attached to the upper tubes adjacent to the spouts 85 at the outlet of said tubes. The said rods are provided with holes 86 at regular distances, through
 125 which and through corresponding holes 87 in the collars pins 88 engage to fasten the adjustments of the telescopic tubes to vary their lengths to the depth of the river in which they are to operate. The lower ends of said
 130 plungers are provided with heavy collar points or feet 89, that have large apertures through them for the entrance of the mud from the bank of the river-bed when the plungers reach the bottom. As the rotary crank-

disks rotate, starting from the position shown in Fig. I, the walking-beams 43 in full line, the vertical shafts draw down on the initial ends of the walking-beams 43, and so com-
 5 mence to elevate the other ends, with their attached pistons, until at a half-revolution of the disks the rocker-arms and piston-heads assume the position shown in dotted lines in said figure and the piston is at its greatest
 10 elevation, ready for its descent as the disk effects the other half of its revolution. It will thus be seen that under the actuation of the rotary crank-disks simultaneously on the trip-action walking-beams 40 and the walk-
 15 ing-beams 43, that operate the pistons of the pumps, they work co-operatively in the alternate elevation and dumping of the plungers and working the pistons of the pumps. It will also be seen that by the intermittent mo-
 20 tion of the plunger entering and leaving the bank in the river-bed and the continuous reciprocating movement of the piston a lively action and removal of deposit is being con-
 25 tinuously effected with such co-operative ac- tion. The tubes of the plungers being made in two parts, one of which telescopes within the other, they are capable of longitudinal
 30 adjustment to accommodate themselves to the depth of the river in which they are operat- ing, and when adjusted are fastened to said
 35 adjustment by pins that pass through perforations in the vertical rods 80 and engage in the collars 84 near the upper ends of the tubes.

When the dredge is to be moved from one part of the river or coast to another, the pins 74, that connect the piston-rods 75 to the walk-
 40 ing-beams 43, are withdrawn, and the parts of the telescopic tubes, plungers, and pistons that are submerged are elevated by the cable
 45 95 from the position shown in full line to that in dotted line. (See Fig. I).

The operation is effected as follows: T-bars 91 are attached by stems to collars 92, that
 45 embrace the outer telescopic tubes of the plunger on a line with the main-deck. These collars have trunnions 93, that have bearings in journal-boxes 94, that are seated on the timbers of the main-deck. This part of the
 50 device provides a vertical pivoted bearing for the plunger when its feet are drawn back toward the stern of the boat, as shown in dotted lines in Fig. I, by the cables 95, which
 55 are secured to perforated lugs 96, that are attached to the feet of the plungers. The said cables pass under the anti-friction rollers 97 and are wound around the capstans 98, which may be turned by a windlass, spike, or
 60 any other suitable means. It will be seen that as the collars turn on their trunnions the T-bars are elevated from the deck, and when the feet of the plungers are again let
 65 down to their operative position the T-bars limit their progress beyond the vertical line and steady them in that position.

Decks 2, 3, and 4 provide easy access to the various parts of the derrick and its machin-

ery, and ladders 99 in various positions give ready access from deck to deck.

A pilot-house or observatory 100 is provided 70 on the upper hurricane-deck.

I have described my invention in its operation in dredging the beds of rivers by current-power as a river-dredge; but I do not
 75 confine myself to said use, for it is evident that by the application of steam or other power in the place of the current-wheel it can be operated for the removal of sand and other bars and banks that obstruct the entrance at the mouths of rivers and harbors. 80

I claim as my invention—

1. In a dredge or excavator, the combination of the twin boats 1, their joint intermediate and hurricane decks, the current-wheel 5, the drive-wheels 29, and the drive-chains 30, 85 that through the spur-gear connections 32 33 operate the rotary crank-disks 35 to actuate the trip-action walking-beams 40 to elevate and trip the plungers 41, through the cylinders of which the mud is elevated, substantially as described, and for the purpose set forth. 90

2. In a dredge or excavator, the combination of the current-wheel on the shaft 8, the drive-wheels on said shaft, and the drive- 95 chains that through the spur-gear connections 32 33 operate the rotary crank-disks 35 by the vertical shaft-connections 42 with the walking-beams 43 to give reciprocating action to the piston-rods 75 and buckets 76 within the telescopic tubes 78 79 of the cylinder, and arranged to pump up the mud dislodged by the plunger and discharge it through the spouts 85, substantially as and for the purpose set forth. 100 105

3. In a dredge or excavator, the combination of the rotary crank-disks operated by the current-wheel through its geared connections and the trip-pins in said crank-disk that operate the trip-levers 47 and through the 110 pivot-links 53 actuate the walking-beam 40 to elevate the plunger, while the trip-pin lifts the initial end of the trip-lever and releases it to take its plunge when said trip-pin disengages from the lever, substantially as described, and for the purpose set forth. 115

4. In a dredge or excavator, the combination of the rotary crank-disks operated by the current-wheel through its geared connections, said disks working the walking-beams 120 43 by the connecting vertical shafts 42 to give reciprocating action to the pistons and their pendent pump-buckets within the vertically-adjustable tubes 78 79, that telescope together, and are thus adjustable to the depth 125 of water in which the dredge operates, and the perforated rods 80, permanently secured to the bottom tubes and adjustably secured to the upper ones by pins 88, that pass through said perforations in the rods, and the collars 130 84 on the upper tubes, substantially as described, and for the purpose set forth.

5. In a dredge or excavator, the rotary crank-disks 35, operated by the current-wheel 5 and

its connection-gearing and operating the walking-beams 40 and 43, that actuate the reciprocating plungers 41 and pistons 75, the trip-pins 44 in said disks being adjustably secured
 5 by the set-screws 46, the swivel-heads of which engage within the collars of the sliding blocks 46 $\frac{1}{2}$, said blocks working in the elongated slots 45 within the disks and arranged to adjust and lock the trip-pins to regulate the height
 10 to which the plungers are lifted, substantially as described, and for the purpose set forth.

6. In a dredge or excavator, the combination of the current-wheel 5, the shaft 8, running in journal-boxes 15, attached to bearing-
 15 beams 18, said beams being hinged to the vertical posts 20, that surmount the beams 21 of the hulls of the vessels, the bearer-beams being vertically adjusted by the screw-shafts 22, that engage in the screw-boxings 23 in the
 20 beams 21, and the pivoted rotary caps 24, that surmount the screw-shaft and are surmounted

by head-blocks 25, arranged to adjust the elevation of the bearer-beams that carry the current-wheel to regulate its dip, substantially as described, and for the purpose set forth. 25

7. In a dredge or excavator, the combination of the T-bars 91, attached by stems to collars 92, that embrace the bottom telescopic tubes of the plunger, the trunnions 93 and journal-boxes 94, arranged to provide a vertical pivot-bearing for the plunger and piston-cylinder, the cables 95, and capstans 98, that operate them to swing the plungers and piston-cylinders on their trunnion-bearings and remove them from obstructions when not operated, substantially as described, and for the purpose set forth. 30 35

JAMES M. SHERMAN.

In presence of—

BENJN. A. KNIGHT,
 SAM'L. KNIGHT.